AN INVESTIGATION OF THE VALIDITY AND RELIABILITY OF NEUROMARKETING CONSTRUCTS IN INFLUENCING INDIAN CONSUMERS' BUYING BEHAVIOUR

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ABSTRACT

Neuromarketing, an emerging discipline combining marketing and neuroscience, is gaining popularity for its ability to understand complex customer behaviour. Businesses are exploring neuromarketing as a strategic tool that actively maps consumer brain activity, comprehends their cognitive responses to various marketing activities and understands how marketing affects consumer psychology. The paper investigates how marketers use neuromarketing to understand consumer behavior and position themselves favourably in consumers' perception. Using an exploratory research design, the paper builds a conceptual model to explore how neuromarketing tools influence consumer behavior, eventually shaping purchasing decisions. A validity and reliability study were conducted on the components of neuromarketing to learn whether the application of neuromarketing techniques influences customer buying decisions. The online survey on the neuromarketing constructs model included 258 respondents who completed questionnaires to examine the five major components. The data were meticulously analysed using the Statistical Package for Social Science (SPSS) and the Analysis of Moment Structure (AMOS) for structural equation modelling (SEM). The outcomes of this analysis unveiled compelling insights: psychological factors such as Emotion, Attention, Memory, and Feeling, along with the Buying decision itself, wield significant and positive influence over consumer buying behavior. These findings underscore the intricate interplay between psychological dynamics and consumer decision-making processes, offering valuable insights for marketers and researchers alike.

Keywords: Neuromarketing, Buying Behaviour, Advertisement, Brand, Pricing, Emotion, Attention, Memory, Feeling, Buying Decision.

INTRODUCTION

Marketers consistently prioritize understanding consumer behavior due to its complexity in a dynamic nature. Consumers exhibit varying behaviors influenced by diverse situations. These behaviors can be broadly classified into two factors: psychological factors encompassing attitudes, preferences, memory, values, emotions, desires, lifestyle, and perception, and reference groups such as peer groups, family, society, and culture. These factors stimulate the consumer's brain, prompting distinct behavior. To adapt to evolving consumer behavior, marketers devise strategies to engage with them effectively. In recent years, marketers have embraced neuromarketing as a novel approach to comprehending the underlying science of consumer behavior. Neuromarketing tactics are founded on scientific concepts about how consumers think and make decisions, which include brain processes that our conscious minds are unaware of. Neuromarketing is the application of neuroscience methods to evaluate specific advertisements, product design, packaging, marketing campaigns, brand image, and price (Dooley, 2011).

It is considered a new form of research and multidisciplinary research that combines commercial advertising, neuroscience, psychology, and business (Sebastian, 2014).

Neuroeconomics utilises techniques initially applied in brain research to address economic issues. Within neuroeconomics, Neuromarketing or consumer neuroscience emerges as a subset focusing on solving challenges within the marketing realm. (Kenning H. a., 2008) Research based on physiological measurements can be applied to a wide range of consumer behaviour, helping to inform pricing, product design, and brand studies. Rather than solely relying on consumer preferences obtained through traditional methods, this technology enables access to concealed insights into the consumer experience. Consequently, it fosters enhanced product design and boosts sales (Panda, 2023).

Traditional methods such as surveys and interviews often do not capture unconscious aspects of consumer behaviour. Neuromarketing addresses this gap by investigating unconscious choice factors such as buying decisions, emotion, feelings, memory, attention. As the technology of neuroscience tools advances, researchers and clinicians are using this technique in business research. These include electroencephalography (EEG) (Cheung, 2010), functional magnetic resonance imaging (fMRI) (René Riedl, 2010), electromyography (EMG), and galvanic skin response (GSR) (Missaglia, 2017), eye tracking (ET) (Pilelienė, 2017), leading to the emergence of the multidisciplinary field known as "neuromarketing." (Alsharif, 2023).

Problem Statement

1. To understand the impact of neuromarketing dimensions on Indian consumers' buying decisions facilitates marketers from crafting tailored campaigns, potentially resulting in better marketing results.
2. To bridge the knowledge gap, we conducted a systematic investigation into the reliability and validity of neuromarketing constructs, specifically focusing on how customers are influenced by the application of neuromarketing techniques in marketing activities.

Objective

1. To systematically investigate reliability and validity essential constructs of Neuromarketing (NM) that affect the buying behaviour and decisions of Indian customers.
2. The study tries to figure out how well neuromarketing constructs such as emotion, attention, memory, feeling understand and influence the buying behaviour of Indian consumers.

LITERATURE REVIEW

The History of Neuromarketing

In 1913, a psychologist named Hugo Munsterberg showed interest in understanding how the mind works in organisational settings. Fast forward to the 1990s, technology improved, allowing scientists to study the brain's activity better through imaging techniques. (Kelly, 2002) Professor Ale Smidt's article "Kijken in het brein" (Looking into the Brain) from 2002 stated neuromarketing to the business for the first time. When Smidts translated the article into English, he changed the title as "Looking into Neuromarketing." (Smidts, 2002). Although Smidts is acknowledged for popularising the term neuromarketing, the discipline's roots trace back to 1999 when Professor Gerry Zaltman conducted the first fMRI (functional magnetic resonance imaging) study for marketing purposes. The Zaltman Metaphor Elicitation Technique was pioneered by Professor Gerald Zaltman at Harvard University as a qualitative research approach. Its purpose is to unearth underlying thoughts and emotions that individuals may not easily articulate using conventional questioning techniques. (Zaltman, 2003) ZMET swiftly rose in prominence, attracting the interest of

numerous major companies such as Coca-Cola, General Motors, Nestle, and Procter & Gamble. Zaltman and his team were commissioned by these organisations to analyse brain scans and examine consumers' neural activity (Kelly, 2002).

In a study conducted in 2003 on neuromarketing, neuroscientist Read Montague employed functional magnetic resonance imaging technology to explore a phenomenon he termed the "Pepsi Paradox." During the study, participants were equally split into groups and instructed to sample two beverages: one being Pepsi and the other Coca-Cola. Montague observed neural activity in the medial prefrontal cortex, a region associated with higher cognitive functions. His conclusion suggested that individuals associated the beverage with favourable imagery and branding messages derived from Coca-Cola advertisements. (Montague, 2004) Dr. Carl Marci, based in the United States, established Inner Scope Research in 2006, specialising in Neuromarketing research. In May 2015, the Nielsen Corporation acquired Inner Scope Research, subsequently renaming it Nielsen Consumer Neuroscience. (Dooley, 2015) Furthermore, despite a critical article published in Nature Neuroscience and efforts by the consumer advocacy group Commercial Alert in 2006, the momentum and expansion of neuromarketing remained unaffected, demonstrating its resilience and ongoing popularity. (Morin, 2011)

Every year, more than \$400 billion is distributed into advertising campaigns. However, traditional methods for evaluating and foreseeing their impact often fall short, as they rely on consumers' willingness and ability to articulate their feelings when encountering an advertisement (Morin, 2011). Neuromarketing sparked controversy among academics and marketers due to its lofty promises and insufficient empirical evidence. Claims ranged from the ability to peek into the consumer's mind to pinpointing the brain's "buy buttons," drawing scrutiny from scholars and researchers (Gurgu, 2020). As academic research in this domain accumulates, the potential of Neuromarketing to uncover and forecast consumer behaviour is becoming increasingly plain. To bridge the divide between scholars and Neuromarketers, the Neuromarketing Science and Business Association (NMSBA) was founded in 2012. Through initiatives such as the annual Neuromarketing World Forum, it aims to promote Neuromarketing research worldwide. (Neuromarketing Science and Business Association (NMSBA), 2019).

Academic research, particularly the precise analytical contributions from the engineering aspect of Neuromarketing, has played a pivotal role in achieving this global breakthrough and acceptance (Hsu, 2017). Therefore, it is crucial to examine the foundational principles of Neuromarketing to assess its potential and capabilities, as well as to offer fresh insights in this domain. Furthermore, various research papers have been published that focus on the theoretical underpinnings of consumer neuroscience, such as marketing, business morality, management, psychology, and consumer behaviour (Hsu, 2017).

Neuromarketing Techniques and Applications

By using insights from neuroscience, neuromarketing offers the potential to reduce customer decision fatigue, a prevalent issue found in a survey by the American Psychological Association. With a third of adults, especially millennials, struggling to make simple decisions, neuromarketing's ability to predict consumer preferences based on brain responses can reduce stress and save time. This predictive power extends across consumer choices, including food, apparel, and entertainment, improving the overall consumer experience.

Advertisements

Most research investigate the influence of advertising on consumers' behaviour, emotional, and cognitive processes, while Neuromarketing studies focus on how consumers figure out, process, and perceive advertisements. (Treleaven-Hassard, 2010) Advertisements stimulate various areas of the brain. Effective commercials affect the ventromedial prefrontal cortex and the ventral striatum. (Kenning P. , 2010) The study confirmed the influence of favourable facial expressions in commercial Advertisements. (Kenning P., 2010) Neuroimaging tools such as EEG can measured the impact of advertising campaigns by monitoring electrical brain activity signals within milliseconds to 1 centimetre of brain structure. (Babiloni, 2011) fMRI is also a unique technology for measuring the distal response of brain areas toward advertising within 5 to 10 seconds and 1 to 10 mm3 of deeper anatomy. (Kühn, 2016) Neuromarketing techniques can effectively evaluate the response and success of an advertising on an individual level. Advertisements can affect the medial prefrontal cortex decision-making area of the brain, resulting in more revenue. (Solomon, 2018). Yahoo developed a 60-second television commercial showcasing joyful, dancing individuals from diverse global backgrounds. The advertisement is set to broadcast during prime-time slots, on cable television, and across online platforms. Customers wearing EEG headgear participated in viewing the advertisement, triggering activity in their limbic system and frontal cortices, responsible for memory and emotional responses. This advertising initiative is a component of Yahoo's $100 million brand campaign. (Burkitt, 2009).

Branding

Brands are psychological ideas that gain power via the connections they generate. Neuromarketing offers excellent approaches for measuring brand connections. EEG coherence was used to find if brand name terms evoke more mental images than non-brand-related words. EEG coherence serves as an indicator of collaboration within specific areas of the brain's hemispheres. Consequently, the research revealed that brand name words elicited a greater imagery response compared to concrete words, signifying increased intra-hemispheric beta wave coherence. (Cheung, 2010). FMRI activity was observed when participants browsed eBay offers and rated their trustworthiness. Women in this study were shown to engage more, and different, brain regions than males when making trust-related judgments (René Riedl, 2010). A brand, according to a researcher, is a collection of functional and emotional qualities that guarantee a distinct and welcoming encounter between a customer and a vendor (Lynch, 2004). The EEG research was conducted to assess customer behaviour (attitudes) toward liked and disliked brands. The study discovered that liked brands had more motivational features and activity signals in the right parietal cortex than rejected ones. (Bosshard, 2016)

Product Design

Neuromarketing helps marketers in better understanding consumers' brains and improving traditional marketing tactics. As a result, Neuro marketing approaches can assist researchers and marketers in designing appealing items before bringing them into the marketplace by researching the consumer's mind reaction to product features (Rindova, 2009). neuroimaging and physiological approaches were employed to figure out the physiological and neurological correlates of consumer behaviour (purchase choices, belief, preference) towards products/brands (Reimann, 2010). Consumer choice is a complex sequence of cerebral activations, with high probability choices being faster. Neuroimaging

may be better suited for gauging responses before product launch, providing insights into product experience. (Cherubino, 2019) Consumer neuroscience can provide a comprehensive understanding of a consumer's inner desires, aiding companies in designing products that align with their preferences, improving product policy (Bloch, 1995). The fMRI investigation revealed that objects associated with status symbols due to cultural conditioning, symbolising affluence, and social prominence, stimulate brain regions related to reward processing. For instance, images of automobiles triggered activity in the left anterior cingulate cortex, the left orbitofrontal cortex, the bilateral prefrontal cortex, and the right ventral striatum. These areas, as per existing knowledge, are associated with motivation, processing rewarding stimuli, anticipating rewards, and decision-making. (O'Doherty, 2004)

The visual part of packaging is a critical carrier of a precisely encoded market communication system. It is a decision and of language that should lead to catching the consumer's attention to a product, decoding the message, generating interest, triggering a purchase decision, and leaving a long-lasting favourable connotation (Cholewa-Wójcik, 2015).

PepsiCo's Frito-Lay division employed neuromarketing to evaluate advertisements, goods, and packaging in the United States. They discovered that matte beige crisps having nutritious elements did produce as much activity in the anterior cingulate cortex as glossy chips. As a result, Frito-Lay moved to matte packaging (Burkitt, 2009).

Websites are designed using neuromarketing strategies, which influence colour schemes, layouts, and text sizes. Certifications, testimonials, and social widgets are common methods for attracting clients. Horizontal layouts are less successful than vertical ones since reading from the top down stimulates the brain and encourages scrolling (Margalit, 2015). In the book "Brainfluence," marketers delve into experimenting with fonts, their length, and weight to comprehend consumer behaviour. Research conducted by Hyunjin Song and Norbert Schwarz at the University of Michigan indicates that the choice between simple and complex fonts can indeed influence consumer behaviour. When it comes to website content, including forms, prioritising simple and easily readable fonts is crucial. This approach minimises friction and promotes user action. (Dooley, Brainfluence - 100 Ways to Persuade and Convince Consumers with Neuromarketing, 2011).

Pricing

Employing anchoring tactics can assist companies in guiding transactions effectively, enabling customers to make informed decisions influenced by the initial information they encounter (José Chavaglia Neto, 2011). A researcher employed pricing coupled with marketing or product. Neuroimaging and physiological methods can assess fair and premium pricing and marketing (e.g., discount, gift-giving, free delivery, price (Wang, 2015). The affordability of pricing determines whether a price appears inexpensive when compared to various prices within the same category (Xia, 2010). EEG/ERP was used to evaluate the effect of sales promotions (e.g., gift-giving, discounts) on consumer feelings and buying decisions. The research showed that discount promotions had a higher influence on purchase decisions than gift-giving sales efforts. (Ramsoy, 2018). Neuromarketing, a key part of neuroeconomics, looks to understand human decision-making processes and how irrelevant information might affect customers' purchase decisions. examines the anchoring effect of pricing on consumer decision-making (José Chavaglia Neto, 2011). Pricing research is based on behavioural assumptions and may be efficiently examined with neuroimaging. It might help you understand why prices are viewed as lower and how time and pressure affect pricing processing Figure 1.
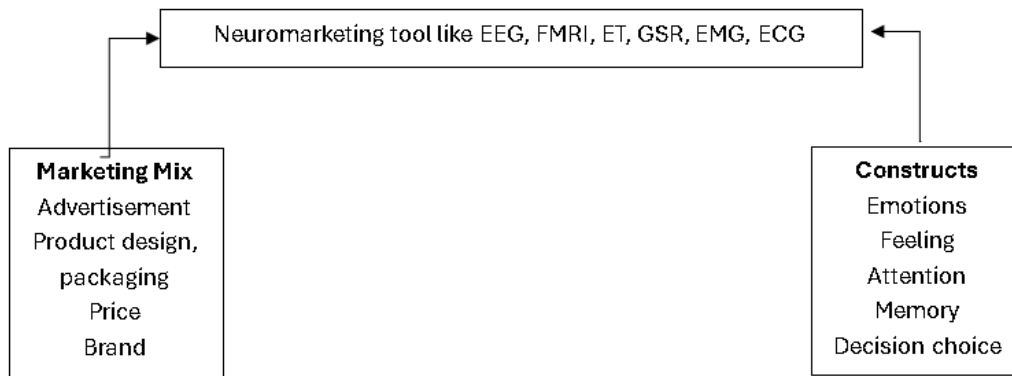
FIGURE 1
AN INTEGRATIVE APPROACH OF NEUROMARKETING MIX

Neuroimaging can reveal the underlying characteristics of pricing data (Lee, 2007). The study implies that cognitive fluency is important in consumer decision-making. Rounded pricing tends to be more easily processed by the brain, whereas odd prices can create cognitive challenges. Emotional decision-making typically involves less cognitive effort compared to intellectual analysis, which demands greater mental energy (Kahneman's, 2011).

Constructs and Hypothesis

Businesses may strategically use neuromarketing approaches to impact customer behaviour in a variety of areas, including advertising, product packaging, design, pricing tactics, sensory marketing, and brand awareness initiatives. By tapping into the subconscious drivers of human decision-making processes, neuromarketing enables companies to create compelling experiences that connect with customers on a deeper level, eventually increasing purchase intent and brand loyalty in today's competitive market. Through considerable study, we have discovered five fundamental constructs: emotion, feeling, attention, memory, and decision-choice that have a substantial impact on consumer purchase decisions. These constructs provide the basis for neuromarketing tactics, providing vital insights into how customers perceive, assess, and select items or products.

Effects of Emotion

Emotions have a crucial role in consumer decision-making behaviour. At the time of purchase, buyers decide based on unconscious emotional reactions including approaching, avoiding, and valence (Thomas, 1995). A compelling argument within neuromarketing research highlights the potential of neuroimaging techniques in identifying essential emotional aspects of advertisements that might be challenging for humans to discern (Rafal Ohme, 2010). Emotion Response Analysis (ERA) uses EEG imaging to figure out how an individual feels in response to a product or commercial. This information is critical for marketers to solve usability concerns. EEG may also be used to assess consumer satisfaction, as shown by a study on a dermatological treatment that found a correlation between consumer fulfilment and brain circuit engagement in face appearance evaluation. (Lajante, 2020) conducted EMG research to assess consumers' pleasure/displeasure with advertisements. Their studies proved that pleasure and dissatisfaction had a favourable impact on consumer behaviour and attitudes toward advertisements. (Kühn, 2016; Eijlers, 2020) employed EEG to study the arousal response to advertisements. The findings proved

that engagement is favourably associated with prominent advertising in the public, but adversely related to consumer feelings of these advertisements. fMRI experiments were undertaken to analyse brain activity regions associated with the emotional aspects induced by TV advertising, such as arousal and pleasure. Their findings demonstrated that the pleasure and displeasure dimensions are linked to increased activity in the brain (Morris, 2009) Furthermore, instruments including as ECG, GSR, IAT, and EMG may be employed to quantify emotional reactions (e.g., sorrow, pleasure, joy, fear, and tension) to advertisements (Missaglia, 2017).

> **H_1:**   *There is positive and significant influence of emotion on the consumer buying behaviour.*

Effects of Feeling

An impulse test was developed to investigate emotional reactions (e.g., joy, happiness, sadness) to dynamic visual stimuli. Their findings demonstrated that the impulse test may record a variety of general feelings when viewing visual stimuli (Gemma Anne Calvert, 2020). EEG, face electromyography (EMG), and skin conductance analysis to examine sensation responses to a changing scenario in a commercial advertising was done. All these approaches revealed significant variations in arousal, even though the changed ad element was not consciously perceived (Rafal Ohme, 2010). Groeppel-Klein (2005) demonstrated that recording Endpoint Detection and Response at the point-of-sale is a valid method for measuring arousal, with arousal significantly related to "joy." EDR can be used to explore visual merchandising concepts and arousal potential of visually striking elements. However, limitations include time requirements, manual artefact detection, and the inability to reveal positive or negative emotions or attitudes (Groeppel-Klein, 2005). Positive feelings can motivate consumers to approach, while adverse feelings might lead to withdrawal or avoidance (Traymbak, 2023; Traymbak, S., Shukla, A., & Dutta, M. 2024). Hyundai did a neuromarketing research in 2011 with fifteen men and women who looked at a newly released car. They were instructed to gaze at automobile parts while attached to EEG devices. The results showed that the car's look would alter depending on the participants' brain activity. The study examined all three components of the participants' brains: emotion, reasoning, and intuition. The look of the automobile changed because of the participant's middle brain sensations. (Prezi , 2015)

> **H_2:**   *There is positive and significant influence of feelings on the consumer buying behaviour.*

Effects of Attention

Attention, crucial for successful engagement, involves capturing a customer's focus on a single purpose amidst multiple reasons. (Traymbak, 2023). Plessis (2005) suggests that our attention might sometimes act unconsciously. Consumers concentrate on a specific feature while dismissing others nearby. Customers prefer product attributes above others due to the filtering impact of their attention. A researcher used eye tracking to evaluate the impact of advertisement's colour temperature on customers' visual attention. The data revealed that the warm hue had a greater influence on customers' visual attention than the cold colour, resulting in higher purchase intention (Pilelienė, 2017). An analysis of 1363 printed advertisements unveiled distinct impacts on attention from the three main components: brand, image, and text. Notably, the visual component consistently captured attention, regardless of its size. Moreover, the size of the text directly influenced attention. These insights can inform the development of more effective advertisements (Pieters, 2004). A Research was performed using a photo of a baby facing the viewer; the results reveal that the viewers were staring at

the baby and paying no attention to the advertisement material. They used eye tracking equipment and heatmaps to place the second shot, which showed the infant glancing at the ad content. The analysis found the region that drew the most viewer attention and assisted marketers in perfecting ad content placement and gaze direction (Swami, 2023). Microsoft is using EEG data to assess player involvement with Xbox games. Microsoft partnered with EmSense to install EEG caps on gamers and display advertisements on the gaming system. The advertisements targeted the areas of the brain to boost viewer engagement and buy intentions. Microsoft's aim is to entice marketers to buy 30-second advertisements on Xbox games, and the corporation is supporting six market research studies (Burkitt, 2009).

> **H₃:**   *There is positive and significant influence of attention on the consumer buying behaviour.*

Effects of Memory

An EEG experiment was conducted to find the brain areas activated by effective memory storage of TV advertisements. An increased activity in the cortical areas was discovered (Astolfi, 2009). Morey (2017) used EEG to study the effect of advertising messages on recognition memory. The findings proved that increased gamma-band activity had a direct effect on memory. The fMRI study evaluates advertisement content, frontal region activity, and memory. The findings proved that the content of advertising increased activity in the frontal regions and affected the input functionality (encoding) of memory. (Langleben, 2009). Cortical activity in the theta band was shown to be greater during the observation of remembered TV advertising than when watching forgotten commercials. Gamma activity increased in both the frontal and prefrontal regions. Furthermore, HRV activity increased during remembering or evaluated good advertisements. The researchers related considerable change in these metrics to the memory and pleasure of the stimulus (Giovanni Vecchiato, 2010). McClure (2004) found that a preference for Coca-Cola, but not Pepsi Cola, was associated with increased activity in the hippocampus. The brand-induced shift in preference was mediated by areas involved in declarative memory (Hilke Plassmann, 2012). Consequently, the Coca-Cola brand had considerably higher associative memory processes in the brain, which has a huge impact on behavioural preferences and decision making and explain the dominance of the Coca-Cola firm in the competitive marketplace (Cherubino, 2019). Dooley suggests that complex fonts boost memory recall and attention but should be used for important information in web copy, not just logos or phone numbers, for memorable and visually appealing effects (Dooley, Brainfluence - 100 Ways to Persuade and Convince Consumers with Neuromarketing, 2011).

> **H₄:**   *There is positive and significant influence of memory on the consumer buying behaviour.*

Buying Behaviour

Researchers in 2011 investigated hungry individuals' attentiveness when provided with popular snacks. They employed eye tracking to check their fixations and evaluated theories of visual search and decision-making. The study discovered that the decision-making process closely resembles the "hybrid model," in which individuals explore for a random period, evaluate the worth of the found items, and then select the best-seen item (Reutskaja, 2011). A study on a wine shop found that customers purchased French and German wine when the business played French or German music but refused to examine the influence of melody on their shopping decisions, demonstrating the power of emotion (North, 1999). According to a study by Singapore researchers Monica Wadhwa and Kuangjie Zhang, pricing influences consumer satisfaction, with rounded prices encouraging emotional purchase

choices and non-rounded prices increasing rational judgments (Wadhwa, 2015). Neuromarketing study explore the major emotions that influence buyer decision-making and apply this knowledge to improve the effectiveness of marketing. The culture is used in product design, marketing and advertising, pricing, retail design, and overall customer experience (Pradeep, 2010). The human brain harbours concealed information about genuine desires and needs, influencing purchasing decisions. Understanding consumer decision-making reduces the costs associated with neuromarketing compared to other information sources. The insights gleaned from various neuromarketing tools can be effectively utilised in designing new products that have the potential to influence consumer purchasing behaviour (Ariely, 2010).

METHODOLOGY

The purpose of this study was to evaluate five neuromarketing (NM) components using a five-point Likert scale. The participants were given a scale to indicate how much they agreed with each construct, with 1 denoting strong disagreement and 5 strong agreements. The data collected from the survey facilitated the assessment of the construct's validity and reliability. To ensure the validity of the qualitative analysis, the research established a sample size of 258 participants. It was decided that this sample size would be adequate for carrying out a thorough qualitative analysis.

The study involved participants from diverse backgrounds, encompassing various age groups, genders, occupations, and educational levels. Geographic representation across different states of India ensured inclusivity of diverse socio-economic and cultural backgrounds. A total of 258 respondents from India participated in the survey. The distribution of respondents across different states is visually represented in Figure 2. For further insights into the demographic characteristics of the respondents, refer to Table 1. Additionally, the Constructs of Neuromarketing Model Method utilised in this study is illustrated in Figure 3. A variety of sampling techniques were utilised, including direct outreach and Google Forms. Convenience sampling predominated, prioritising accessibility and feasibility. The sample size was determined based on statistical principles to ensure adequate power for analysis and interpretation.
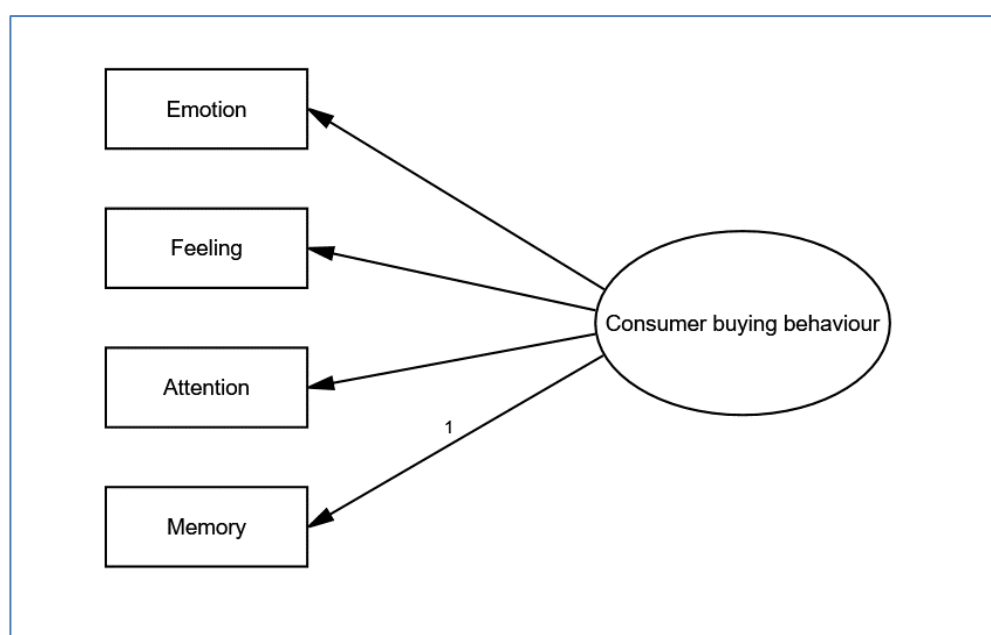
FIGURE 2
CONCEPTUAL FRAMEWORK OF NEUROMARKETING

| Table 1 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS		
Age	**Numbers**	**Percentage**
18 to 25 years	59	23.00
25 to 32 years	122	47.00
32 to 45 years	67	26.00
above 45 years	10	4.00
Gender		
Female	124	48.00
Male	134	52.00
Education Qualification		
Doctorate Degree	2	1.00
CA, CFA, CMA, or others	22	9.00
Doctorate	8	3.00
Higher Secondary School	27	10.00
Postgraduate	84	33.00
Undergraduate	115	45.00
Work Experience		
0 - 2 years	99	38.00
2 to 5 years	95	37.00
6 to 10 years	38	15.00
more than 10 years	26	10.00
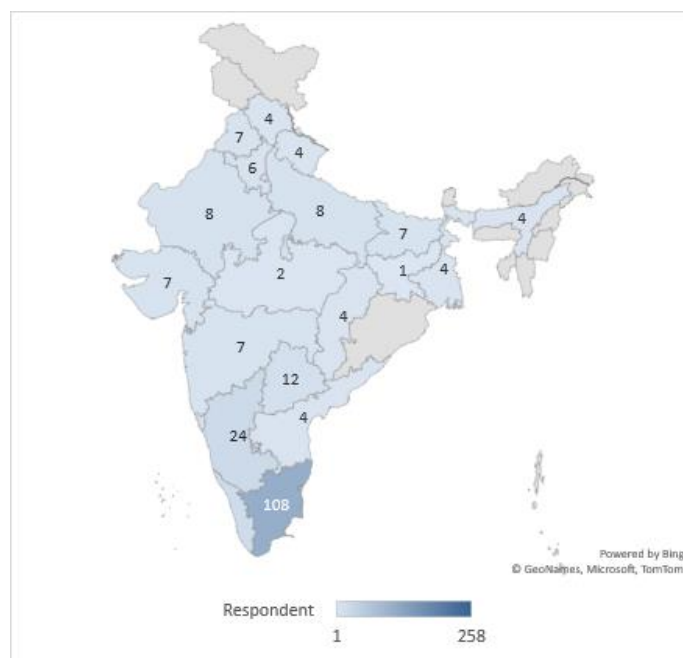
FIGURE 3
DEMOGRAPHIC DETAIL OF RESPONDENT STATE WISE

Kaiser-Meyer-Olkin (KMO) test

The Kaiser-Meyer-Olkin (KMO) test is a method for deciding the appropriateness of data analysis. A KMO score greater than 0.8 shows that the sample is sufficient for analysis. This investigation found that the KMO value was 0.844., as shown in Table 2; This proves that the model satisfies the analysis criteria.

Table 2 KMO AND BARTLETT'S TEST		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	**0.844**	
Bartlett's Test of Sphericity	Approx. Chi-Square	4166.45
	df	190
	Sig.	0

Measurement of Variables

This study uses a variable measurement model that includes twenty factors being five neuromarketing (NM) constructs: Attention (A), emotions(E), Feeling (F), Memory (M), and Buying behaviour (B). Participants provided responses using a five-point Likert scale, indicating their level of agreement or disagreement with the statements presented in the questionnaires.

Tools for Statistical Analysis

The study used SPSS version 21.0 and AMOS 24 as statistical tools to analyse the data, assessing both reliability and construct validity. These software platforms supported confirmatory factor analysis, also known as CFA, and exploratory factors analysis (EFA), enabling thorough examination of the datasets.

Data Analysis

The purposes of the study were to develop a valid and reliable scale to measure Neuromarketing constructs. Cronbach's alpha was computed using SPSS to figure out the validity of Neuromarketing (NM) factors.

Table 3 FACTOR LOADING AND CRONBACH'S ALPHA			
Variable	**Question**	**Extraction**	**Cronbach's Alpha**
A1	Do you pay attention to message and artist featured in advertisement	0.912	0.935
A2	Do you give preference for attractive product packaging	0.904	
A3	Do you get attracted to a brand's logo based on its colour and shape?	0.814	
A4	Do you pay attention to products when prices end like 'now 99,' 'just 199,' '499,' or '799'?	0.729	
E1	Does the message or storyline in advertisements connect with you emotionally?	0.823	0.902
E2	Do you prefer products that bring you happiness through their packaging, design, and quality?	0.616	
E3	Do you feel a brand's story has emotional significance?	0.778	

E4	Does the price of a product affect how happy or satisfied you are?	0.89	
F1	Do you believe certain advertisements evoke feelings of happiness, sadness, anger, or irritation	0.715	0.898
F2	Do you Favour products that provide a sense of comfort?	0.715	
F3	Do you feel satisfied shopping in reputed brands?	0.838	
F4	Do you believe that higher-priced products are typically of higher quality?	0.833	
M1	Do you find that advertisements leave an impression on your memory?	0.574	
M2	Do you recall an experience or impression certain products give you?	0.83	0.850
M3	Do you recall details such as store ambiance, music, which contribute to a pleasant atmosphere?	0.816	
M4	Do you remember offers and discounts that are available?	0.624	
B1	Do advertisements influence your buying decisions?	0.741	
B2	Do you make buying decisions based on the features of a product?	0.738	0.875
B3	Do you consider a brand's reputation when making purchases?	0.725	
B4	Do you make purchasing decisions based on the price of a product?	0.774	

A reliability metric called Cronbach's alpha has a range of 0 to 1, typically values between 0.6 and 0.7 being regarded as satisfactory and 0.8 or above denoting exceptional dependability. As depicted in Table 3, the Cronbach's alpha values for each construct surpassed 0.8, proving outstanding internal consistency. Overall, the results point to excellent internal consistency dependability for the constructs in this study, with the constructs displaying good loading factors and Cronbach's alpha values over the acceptable level, showing the measurement model's resilience.

In the exploratory factor analysis (EFA), Principal Components Analysis (PCA) was utilised as the method of decomposition, enabling the identification of underlying patterns in the data without preconceived notions. Varimax rotation was employed for rotation, facilitating the exploration of hidden variables, and allowing for unrestricted investigation. These loadings offer insights into the strength and direction of the relationship between each observed variable and the underlying latent factor, aiding in the interpretation of the underlying constructs represented by each component.

The factor loadings from the exploratory factor analysis (EFA) reveal that the data can be grouped into five distinct components or dimensions. Component 1 comprises variables A1, A2, A3, and A4, suggesting a common underlying theme represented by these variables. Similarly, Component 2 includes variables E1, E2, E3, and E4, indicating another distinct aspect of the data. Variables F1, F2, F3, and F4 load heavily on Component 3, while Component 4 consists of variables M1, M2, M3, and M4. Component 5 is characterised by variables B1, B2, B3, and B4 as shown in table 4. Overall, the EFA analysis reveals distinct factors or dimensions underlying the data, including emotion, attention, memory, feeling and buying decision. These observations can guide other analysis and interpretation of the data to understand consumer buying behaviour more effectively.

Table 4 ROTATED COMPONENT MATRIX					
Components	1	2	3	4	5
A1	0.930				
A2	0.931				
A3	0.857				
A4	0.842				

E1		0.823		
E2		0.740		
E3		0.799		
E4		0.884		
F1			0.749	
F2			0.783	
F3			0.878	
F4			0.870	
M1				0.729
M2				0.838
M3				0.886
M4				0.686
B1			0.789	
B2			0.833	
B3			0.805	
B4			0.826	

A multivariate statistical approach known as confirmatory factor analysis (CFA) is used to decide how well the measured variables are the number of components. Confirmatory factor analysis (CFA) allows researchers to find the factors needed in the data and which measurable variable is related with which hidden variable. The phrase "average variance extracted" (AVE) refers to the ratio of the variation accounted for by a construct to the variance caused by measurement error. Average variance extracted plays a significant role in assessing the convergent validity of a scale, while internal consistency reliability (measured by Cronbach alpha) provides an understanding of the consistency of measurement items. Average variation extracted (AVE) and composite reliability (CR) are simple measures in CFA to assess the reliability and validity of constructs in a measurement model.

Table 5 AVE AND CR OF THE CONSTRUCTS OF NEUROMARKETING		
Constructs	**CR**	**AVE**
Attention		
A1		
A2	0.907	0.711
A3		
A4		
Emotions		
E1		
E2	0.862	0.613
E3		
E4		
Feeling		
F1		
F2	0.859	0.605
F3		
F4		
Memory		
M1		
M2	0.808	0.518
M3		

M4		
Buying behaviour		
B1		
B2	0.833	0.555
B3		
B4		

In contrast, the Composite Reliability (CR) test evaluates the reliability of a concept by examining the consistency of responses among its constituent elements. In general, when the Average Variance Extracted (AVE) exceeds 0.5 and the CR exceeds 0.7, this shows strong convergent validity and internal consistency dependability, respectively. Table 5 provides a summary of the average variance extracted (AVE) and composite reliability (CR) values for the five components analysed in the study. These indications offer a clear picture of the validity and dependability of the applied standard. AVE values, ranging from 0.513 to 0.711, represent the ratio of variance explained by items in each construct compared to measurement error; higher values show stronger convergent validity.

Similarly, CR values greater than 0.8 shows the structure's dependability and the degree to which the elements in every component are connected. The findings show that the concept had good levels of convergent validity and internal fit. This highlights the measuring model's dependability and robustness, as well as the need of capturing and understanding the complexities of consumer behaviour in search.

Measurement Model

The measurement model used in the study incorporates latent variables such as Attention (A), emotions(E), Feeling (F), Memory (M), and Buying decision (B)encompassing various sides of consumer behaviour as shown in figure 4.

The findings from the confirmatory factor analysis (CFA) of the structural model provide insights into the fit of the model to the data. The CMIN/DF ratio, a measure of goodness of fit, yielded a value of 3.09, falling within the acceptable range of 2 to 5, indicating a good fit for the model. Additionally, the Root Mean Square Residual (RMR) value of 0.06 was below the threshold of 0.08, further supporting a good fit as indicated in table 6. However, some fit indices suggest a marginal fit for the model. The Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) values were 0.84 and 0.80, respectively, falling below the recommended threshold of 0.90 to 0.95. Similarly, the Root Mean Square Error of Approximation (RMSEA) value of 0.09 falls within the marginal range of 0.05 to 0.10, indicating some room for improvement in model fit.

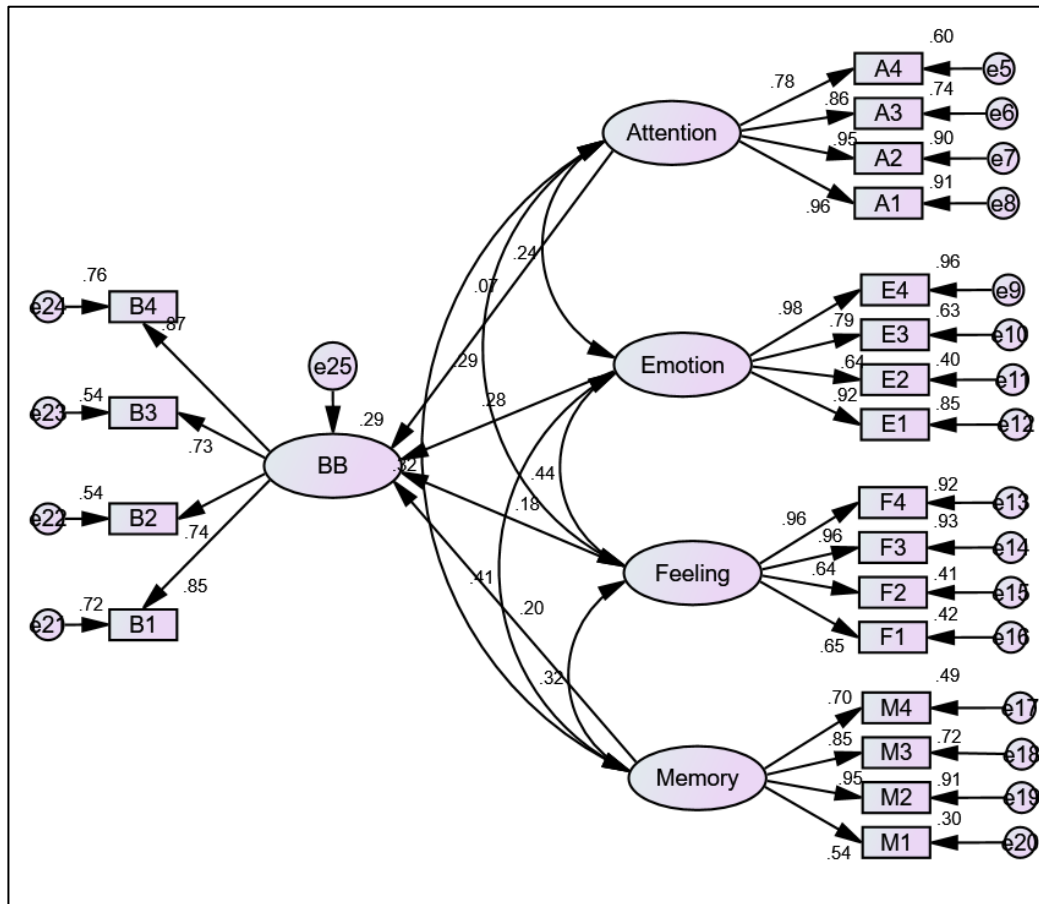| Table 6 MEASUREMENT MODEL PARAMETERS			
Fit Indices	**Default model**	**Standard Value for Acceptability**	**Model Fit**
CMIN/DF	3.09	2 <CMIN/DF< 5	Good
RMR	0.06	< 0.08	Good
GFI	0.84	0.90 < GFI < 0.95	Marginal Fit
AGFI	0.80	0.85 < AGFI < 0.90	Marginal Fit
NFI	0.9	0.90 <NFI< 0.95	Good
TLI	0.93	> 0.90	Good
CFI	0.92	0.90 < CFI < 0.97	Acceptable
RMSEA	0.09	0.05 < RMSEA < 0.10	Marginal Fit
PCLOSE	0.00	< 0.05	Good
IFI	0.92	0.90< IFI <0.95	Good

FIGURE 4
MEASUREMENTS MODEL OF NEURAL MARKETING

Despite these marginal findings, several fit indices support a good fit for the model. The Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Probability of Close Fit, and Incremental Fit Index (IFI) all yielded values above the recommended thresholds, indicating acceptable to good fit for the model.

Hypothesis Testing

	Estimated Path Coefficient	Standard Error	Critical Ratio	P	Hypothesis Accepted
Table 7 **STRUCTURAL MODEL ANALYSIS**					
Buying behaviour - Emotion	0.221	0.055	4.02	***	H1 Accepted
Buying behaviour - Feeling	0.133	0.051	2.592	0.01	H2 Accepted
Buying behaviour - Attention	0.066	0.064	1.036	0.3	H3 Not Supported
Buying behaviour - Memory	0.22	0.078	2.815	0.005	H4 Accepted

Note: ***$p < 0.001$.

As shown in table 7, H1 predicts that emotion should positively relate to buying behavior. The results indicate a significant positive impact of emotion on buying behavior (β = 0.221, SE = 0.055, CR = 4.02, p < 0.001). Thus, the results support H1, suggesting that emotion positively influences buying behavior. As indicated H2 predicts that feeling should positively relate to buying behavior. The results reveal a significant positive impact of feeling on buying behavior (β = 0.133, SE = 0.051, CR = 2.592, p = 0.01). Therefore, the results support H2, indicating that feeling positively influences buying behavior. H3 predicts that attention should positively relate to buying behavior. However, the results demonstrate a non-significant positive impact of attention on buying behavior (β = 0.066, SE = 0.064, CR = 1.036, p = 0.3). Hence, the results do not support H3, and it is rejected. H4 predicts that memory should positively relate to buying behavior. The results exhibit a significant positive impact of memory on buying behavior (β = 0.22, SE = 0.078, CR = 2.815, p = 0.005).

Regarding the specific hypotheses tested within the model, three hypotheses (H1, H2, and H4) were supported by the data, indicating significant positive relationships between emotion, feeling, memory, and buying behavior. However, one hypothesis (H3) was not supported, suggesting that attention does not significantly relate to buying behavior in this model.

Discussion, Implication and Limitations

Neuromarketing research plays a key role in understanding patterns of brain activity by exploring how people physically react to marketing stimuli. To increase marketing effectiveness and boost sales, neuromarketing makes use of insights from both neuroscientific research and consumer behaviour. Major neuromarketing constructs Attention (A), Emotion (E), Feeling (F), Memory (M), and Buying decision (B) are found via empirical investigation as significant factors influencing customer buying decisions. By addressing a significant knowledge gap in the Indian context, this research provides empirical evidence for the validity and dependability of these attributes. This research provides insightful information for marketers looking to tailor their tactics to the ever-changing Indian market by illuminating the relationship between neuromarketing concepts and customer behaviour.

This study aims to explore the influence of psychological factors on consumer buying behavior within the context of neuromarketing, particularly in a developing market such as India. In this study, three out of the four hypotheses were supported, while one was not supported. Regarding the estimated path coefficients, the results indicate that three hypotheses (H1, H2, and H4) were accepted, while one hypothesis (H3) was not supported. Specifically, the path coefficients for emotion, feeling, and memory positively influenced buying behavior, supporting H1, H2, and H4, respectively. However, the path coefficient for attention did not significantly affect buying behavior, leading to the rejection of H3. These findings highlight the nuanced relationship between psychological factors and buying behavior, emphasizing the importance of considering various contextual factors in understanding consumer behavior.

This study holds significant value for stakeholders across the retail industry, encompassing retailers, marketers, and consumers alike. For retailers, the study's insights offer opportunities to refine marketing strategies and stimulate sales growth by tapping into the subconscious dimensions of consumer behavior. Through optimizing store layouts, product placements, pricing strategies, and promotional tactics, retailers can elevate customer satisfaction and drive revenue. Marketers stand to benefit by leveraging the study's findings to craft more impactful advertising campaigns, packaging designs, and branding strategies. By understanding the underlying psychological factors shaping buying behavior, marketers

can develop messaging and visuals that deeply resonate with their target audience, fostering heightened brand awareness, loyalty, and sales.

Consumers indirectly profit from the study's insights, enjoying a more personalized and enjoyable shopping experience through improved marketing materials. Additionally, empowered with knowledge about the factors influencing their purchasing decisions, consumers can make more informed choices aligned with their preferences and needs. By incorporating the insights from this study, businesses can transform their understanding of consumer behavior and engagement, leading to the development of more effective marketing strategies, increased sales, and enhanced customer satisfaction.

In the future, research on the validity and reliability of neuromarketing constructs in influencing Indian consumers' buying behavior could involve longitudinal studies to track changes over time and assess the long-term impact of neuromarketing interventions. Additionally, exploring the integration of neuromarketing techniques with emerging technologies such as artificial intelligence and augmented reality could offer innovative ways to enhance consumer engagement and decision-making processes in the Indian market.

CONCLUSION

The Indian market is expanding, but influencing consumer buying patterns is still difficult. Understanding customer behaviour may be enhanced by neuromarketing (NM), especially when it comes to the Indian market. Buying behaviour may be predicted by crucial factors such as Attention (A), emotions(E), Feeling (F), Memory (M), and Buying decision (B). By offering useful perspectives for Neuromarketing implementation in the Indian setting. This model, rooted in consumer buying behavior theory (neuromarketing), elucidates the pivotal factors driving neuromarketing's growth. Empirically tested through Structural Equation Modelling (SEM), it aims to elucidate the influence of psychological factors on consumer buying behavior within the Indian context. The study highlights the significance of various factors such as advertisements, product packaging, design, logos, brand colours, themes, store ambience, music, and sensory marketing strategies in attracting consumers. Results indicate that out of the four hypotheses tested, three factors such as emotions, feelings, and consumer sensory memory which demonstrates a significant relationship with consumer buying behavior, while attention shows an insignificant relationship in this study. Marketers may obtain deeper insights into customer behaviour patterns by using Neuro marketing constructs. This allows them to develop more successful marketing strategies that are specifically customised to the distinctive features of the Indian consumer environment.

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